

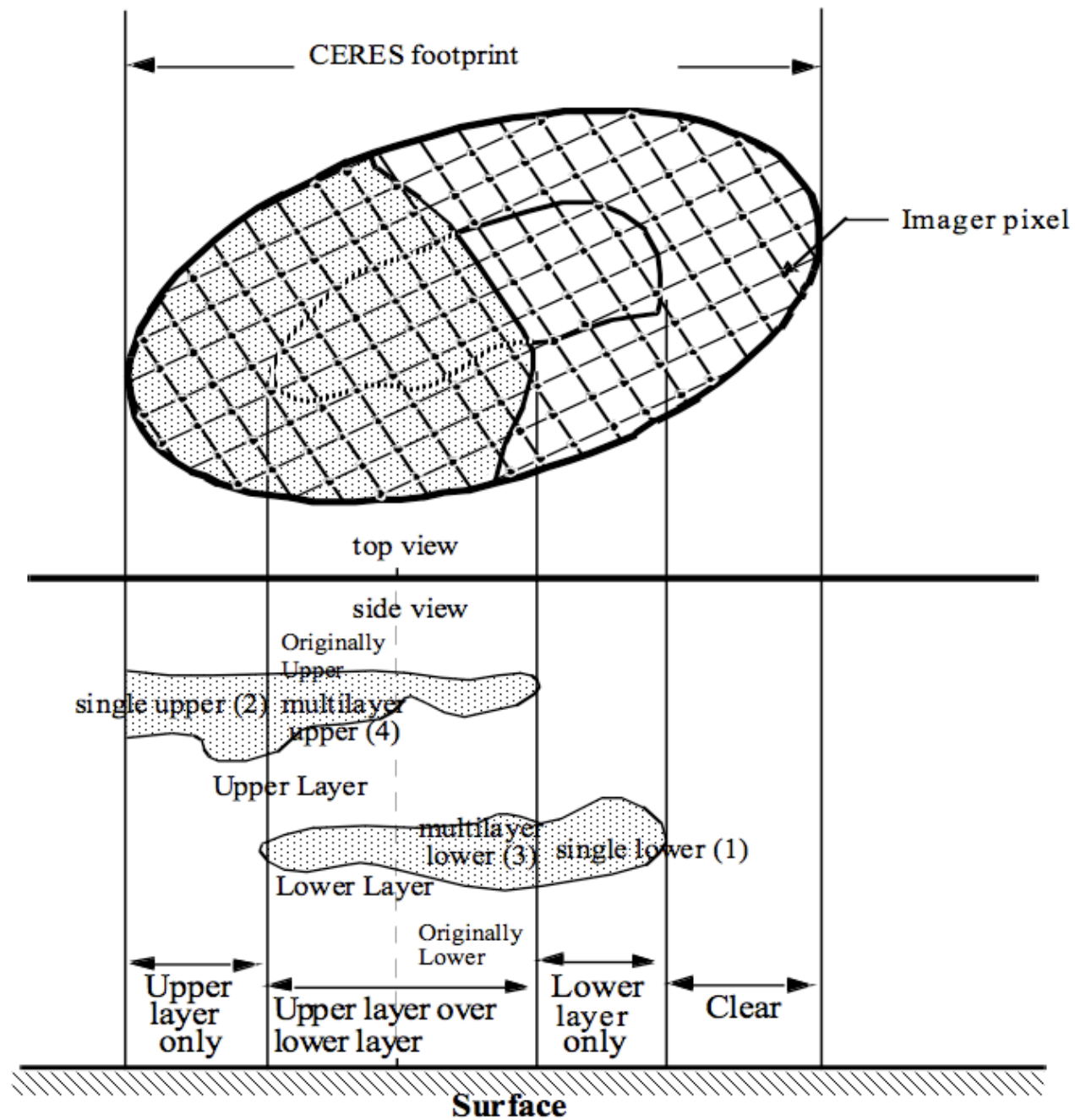
Update on CERES Ed3 Overlap Cloud Properties

Fu-Lung Chang (SSAI)

Patrick Minnis (LaRC) and CERES Cloud Working Group

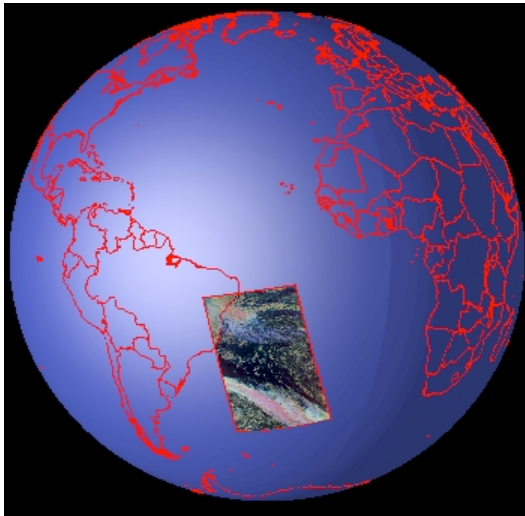
- What Have We Learned from Beta2
- Possible Evaluation Using 1.38- μm Data

April 27-29, 2010 CERES Science Team Meeting, Newport News, VA

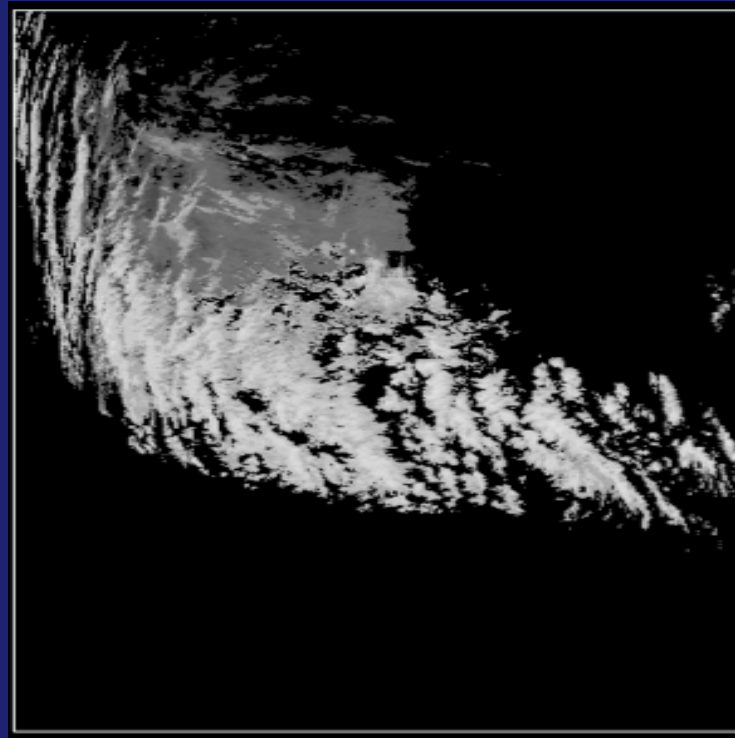
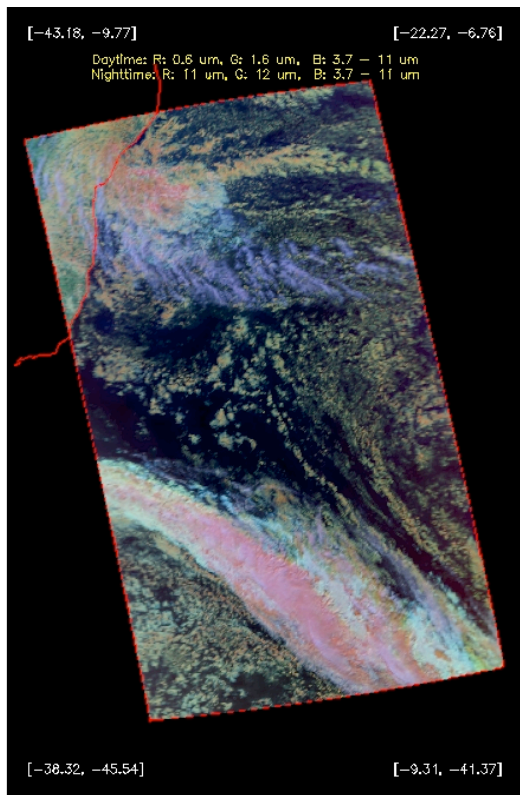


How Do We Do It

Cirrus Cloud Height Retrieval Using a Modified CO₂-absorption Technique (Chang et al. 2010)



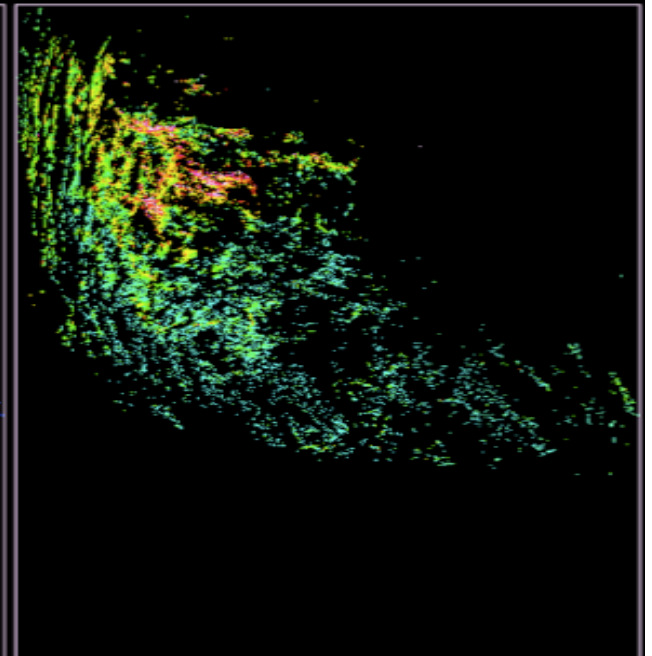
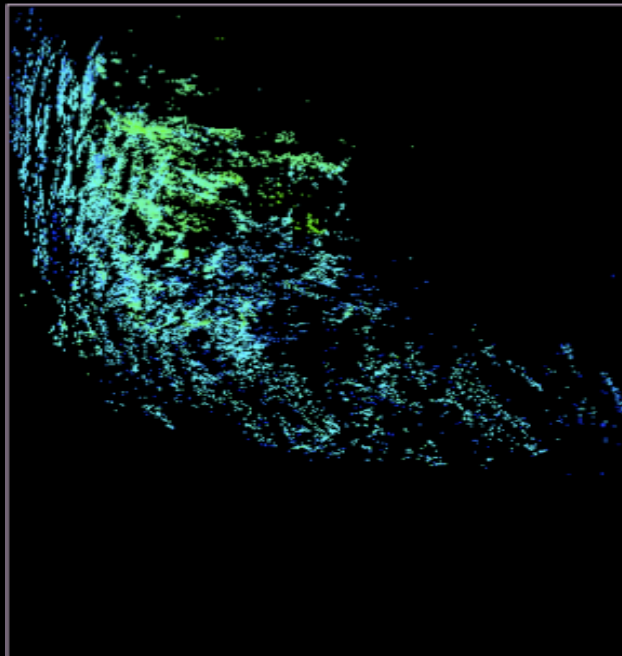
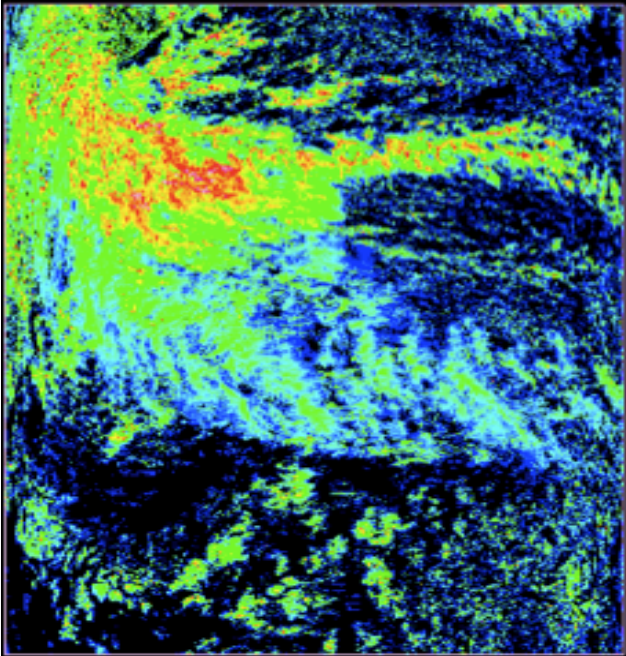
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Date: 07/15/2006 15:45:00



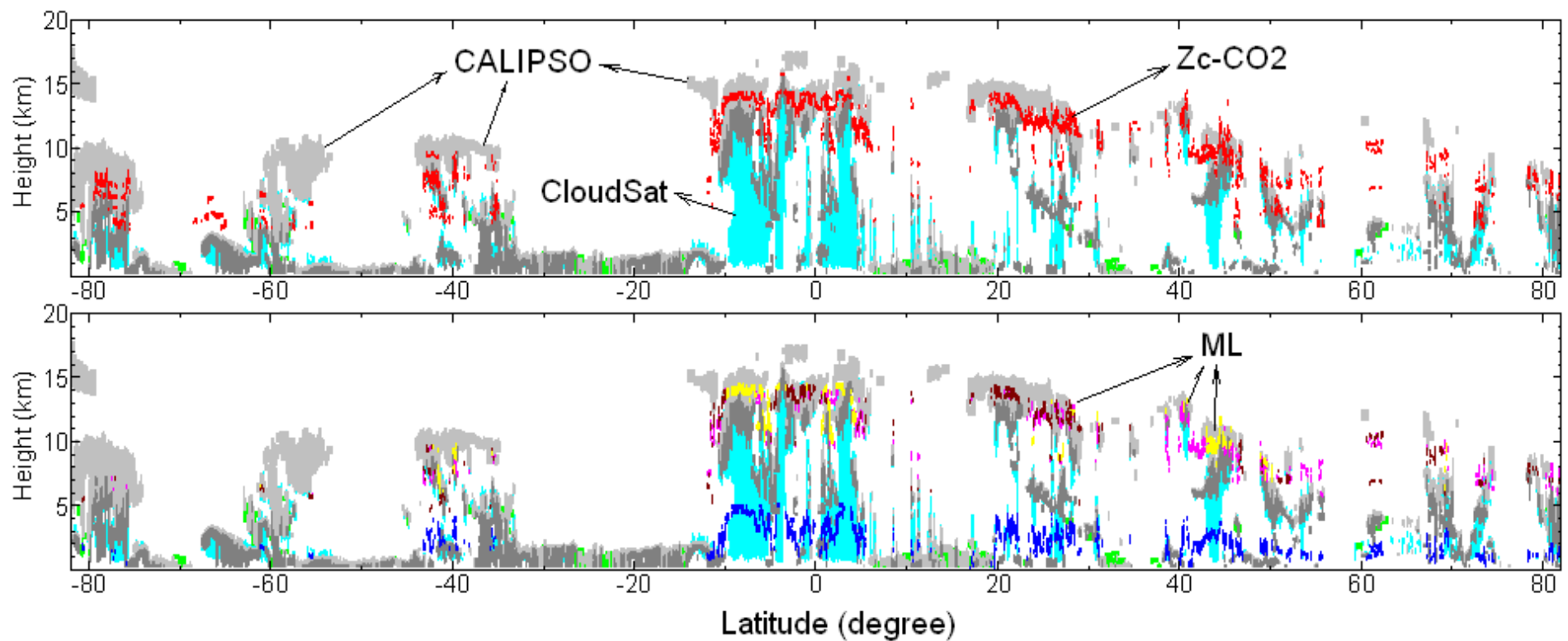
Total Cloud
Optical Depth

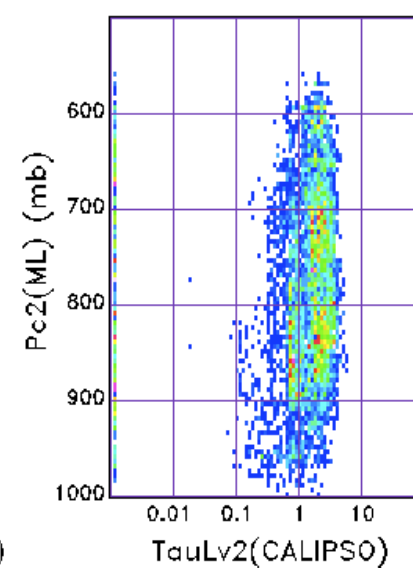
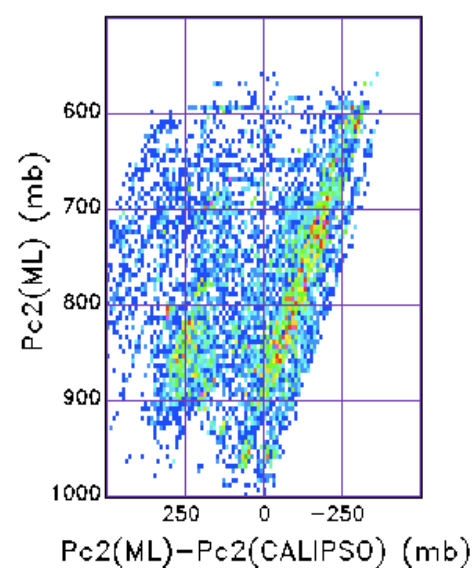
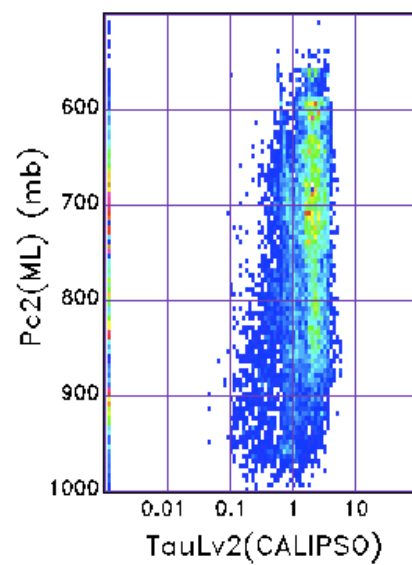
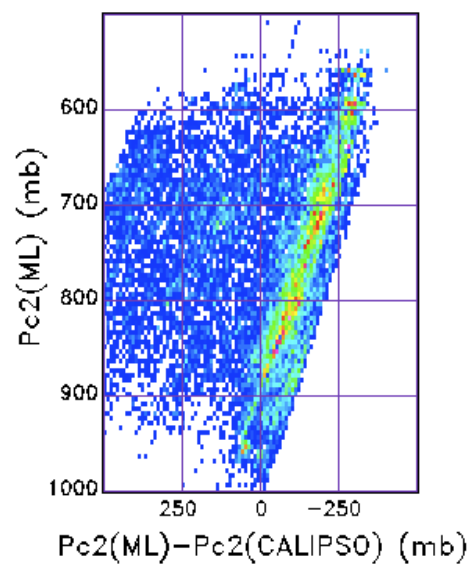
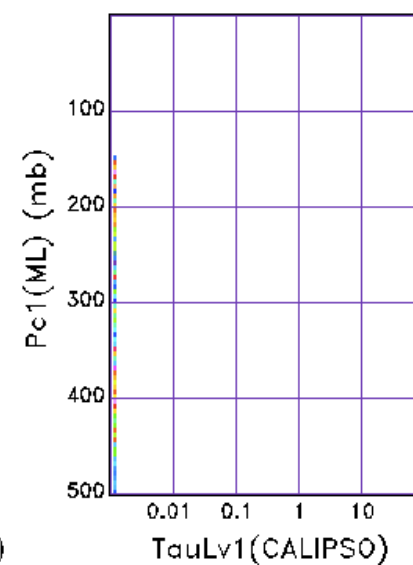
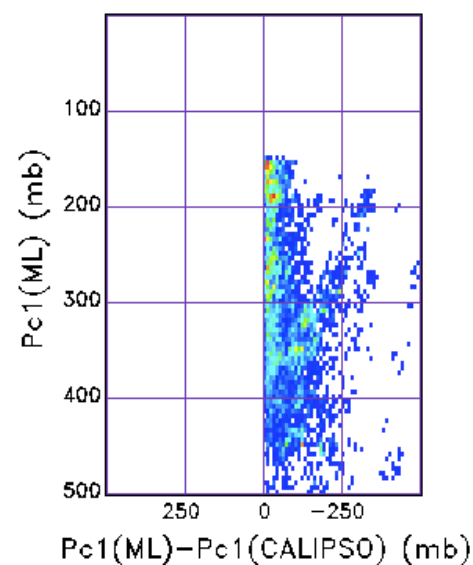
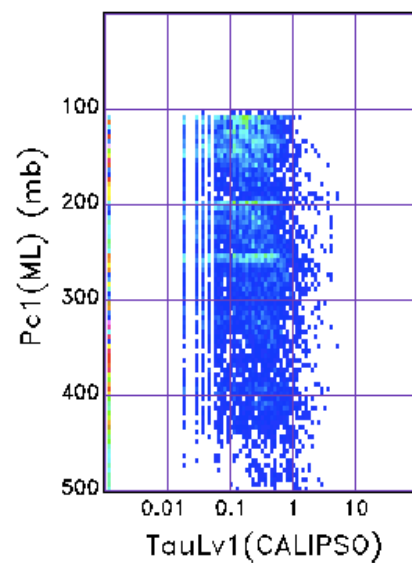
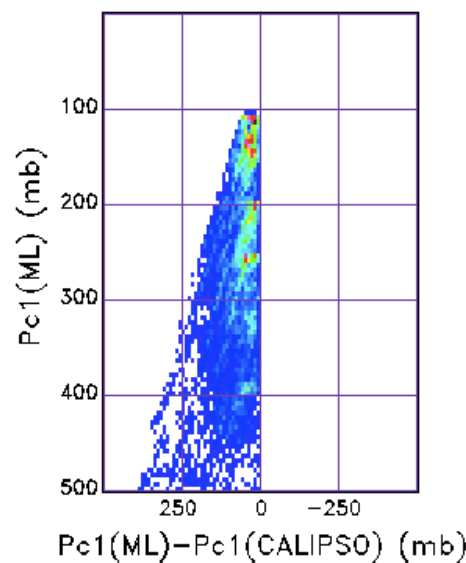
Upper-Cirrus Cloud
Optical Depth

Lower Cloud
Optical Depth

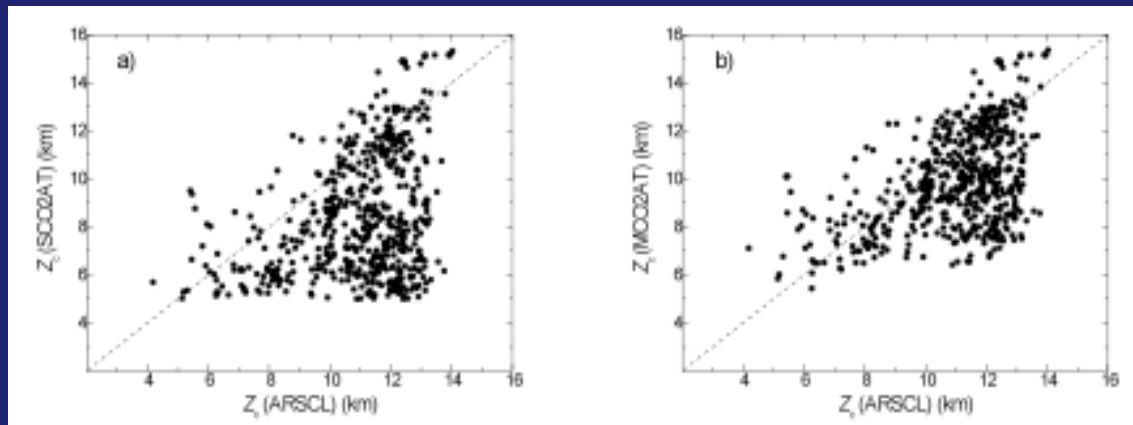


What Were the Evaluations from Beta1 and Beta2

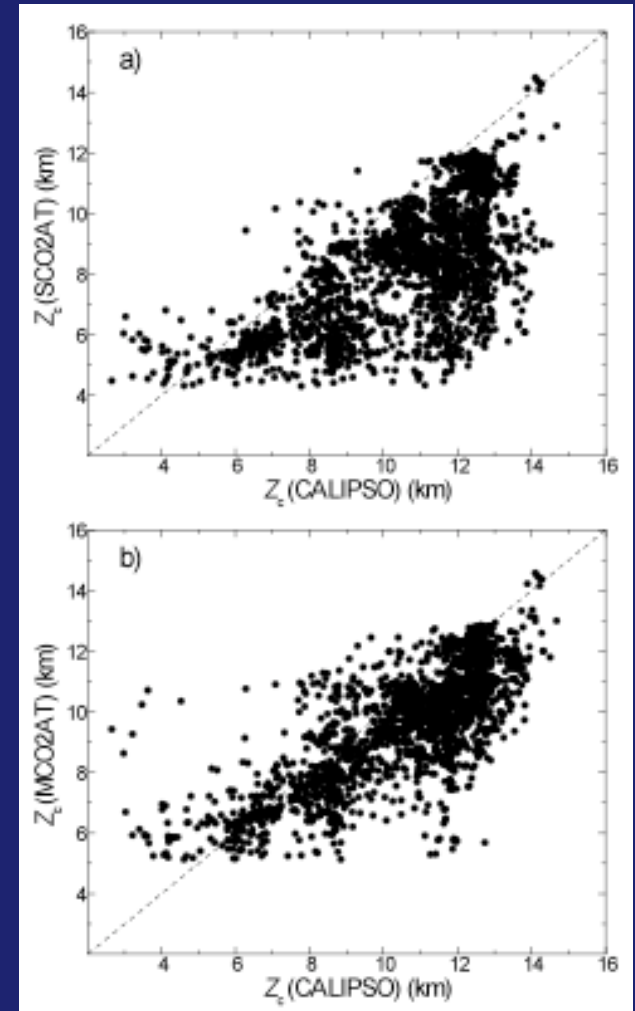




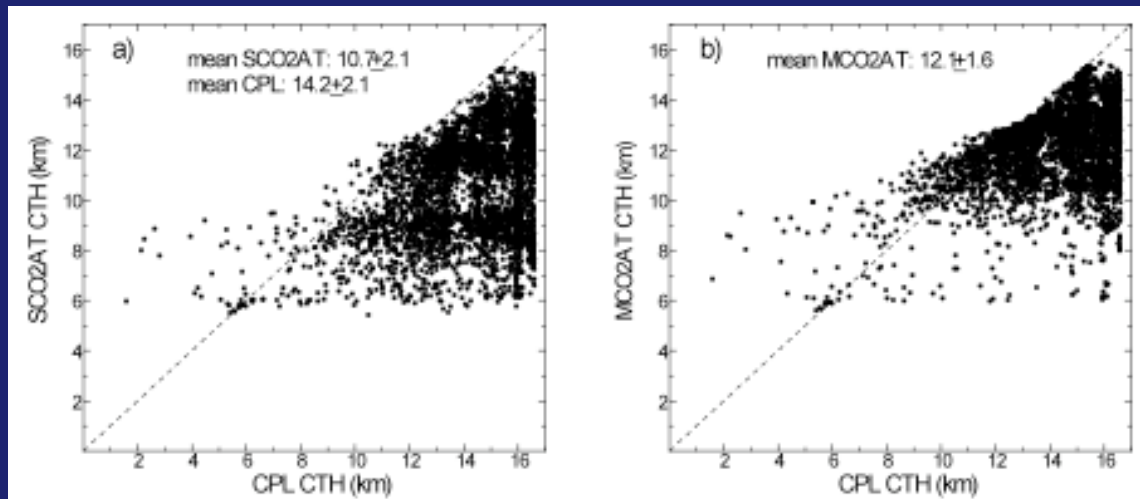
Comparison with ARM Ground-based ARSCL Data



Comparison with CALIOP Data



Comparison with TC4 Aircraft-based CPL Data



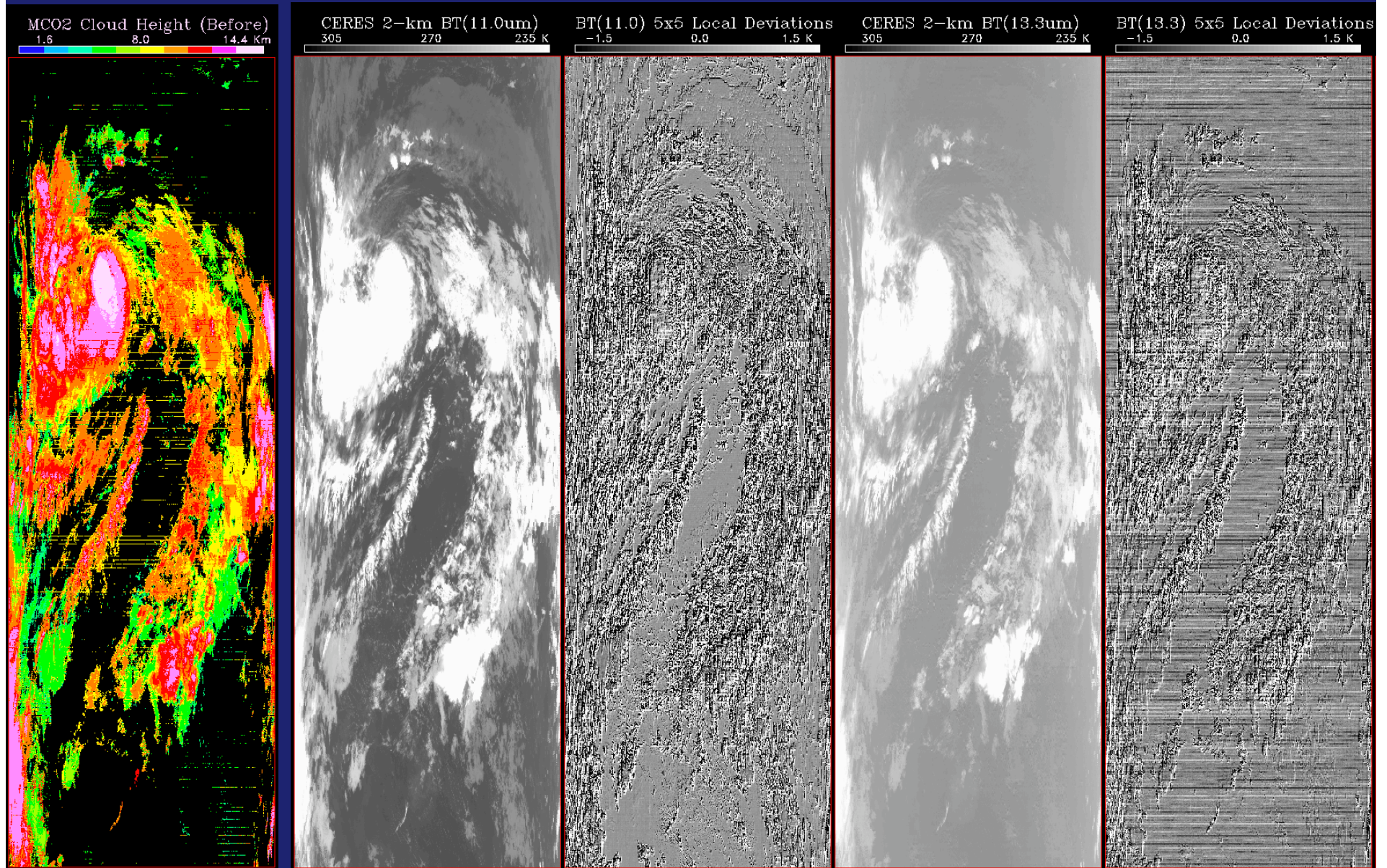
(Chang et al. 2010a,b JGR)

So What Have We Learned?

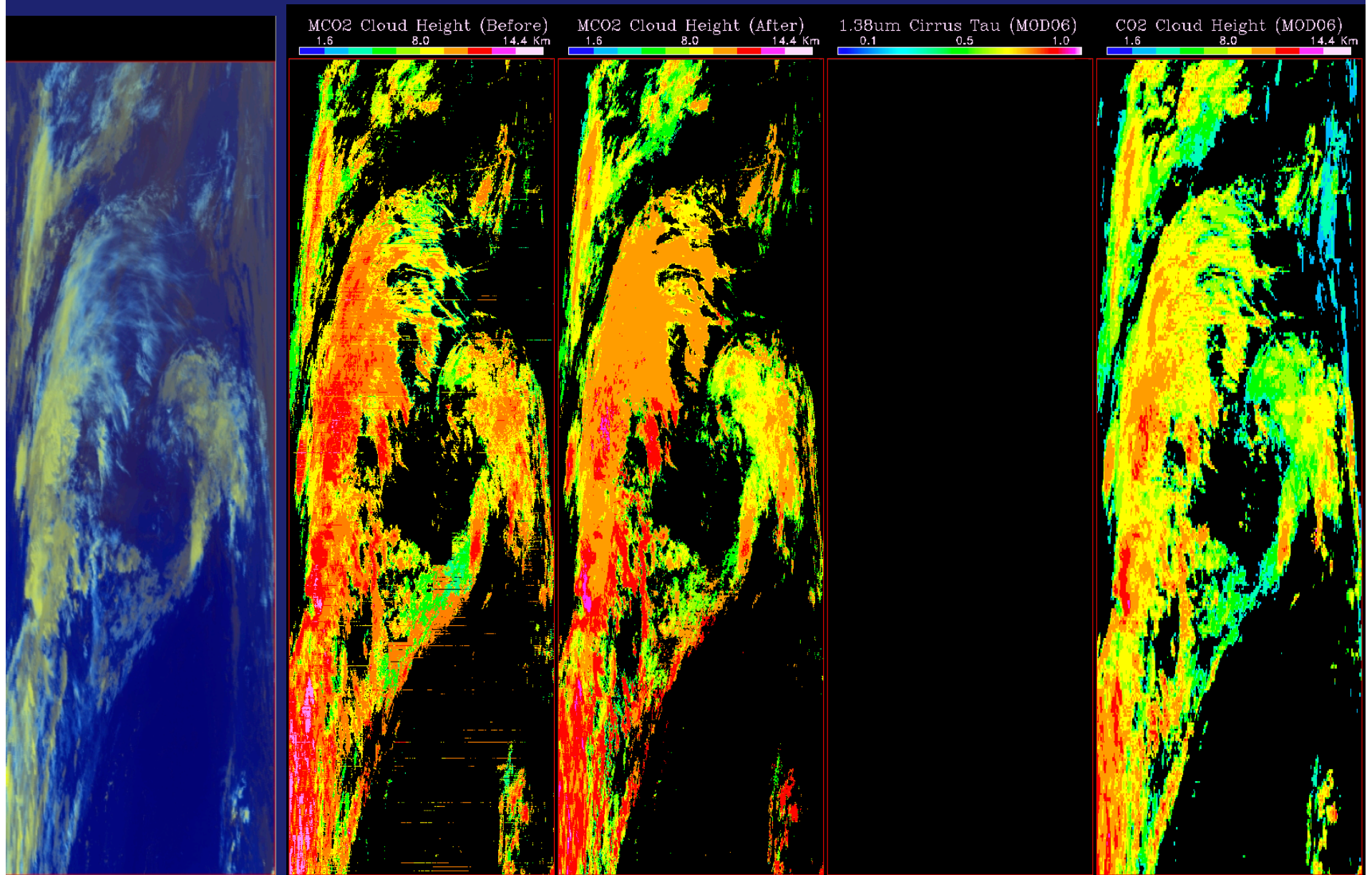
- Beta1 Underestimation?
- Beta2 Overestimation?
- Cloud Top Height Retrieval Accuracy?

=> Require one-to-one pixel comparisons

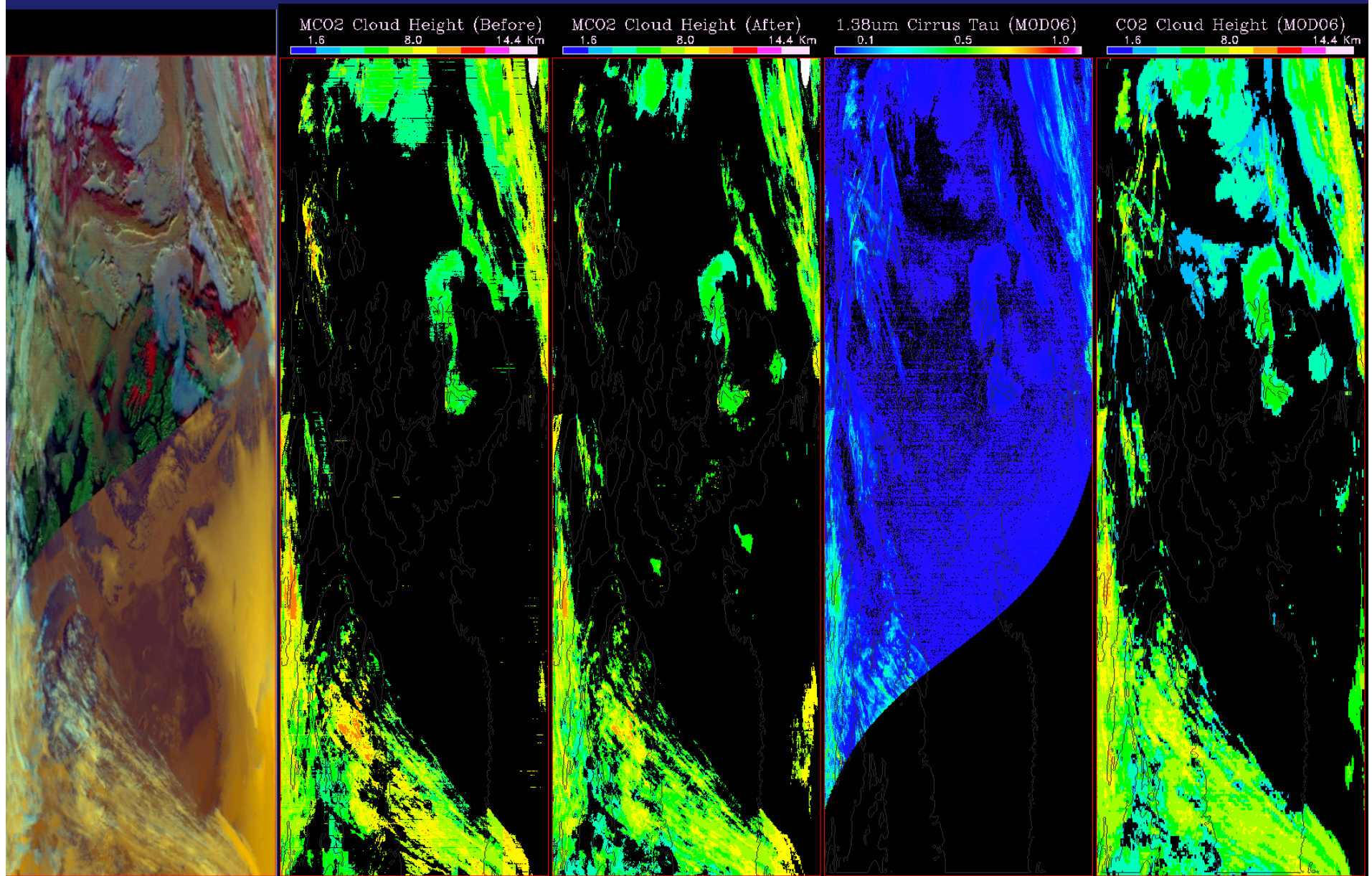
Found CO2 Cloud Height Striping Problem at 1-km Data



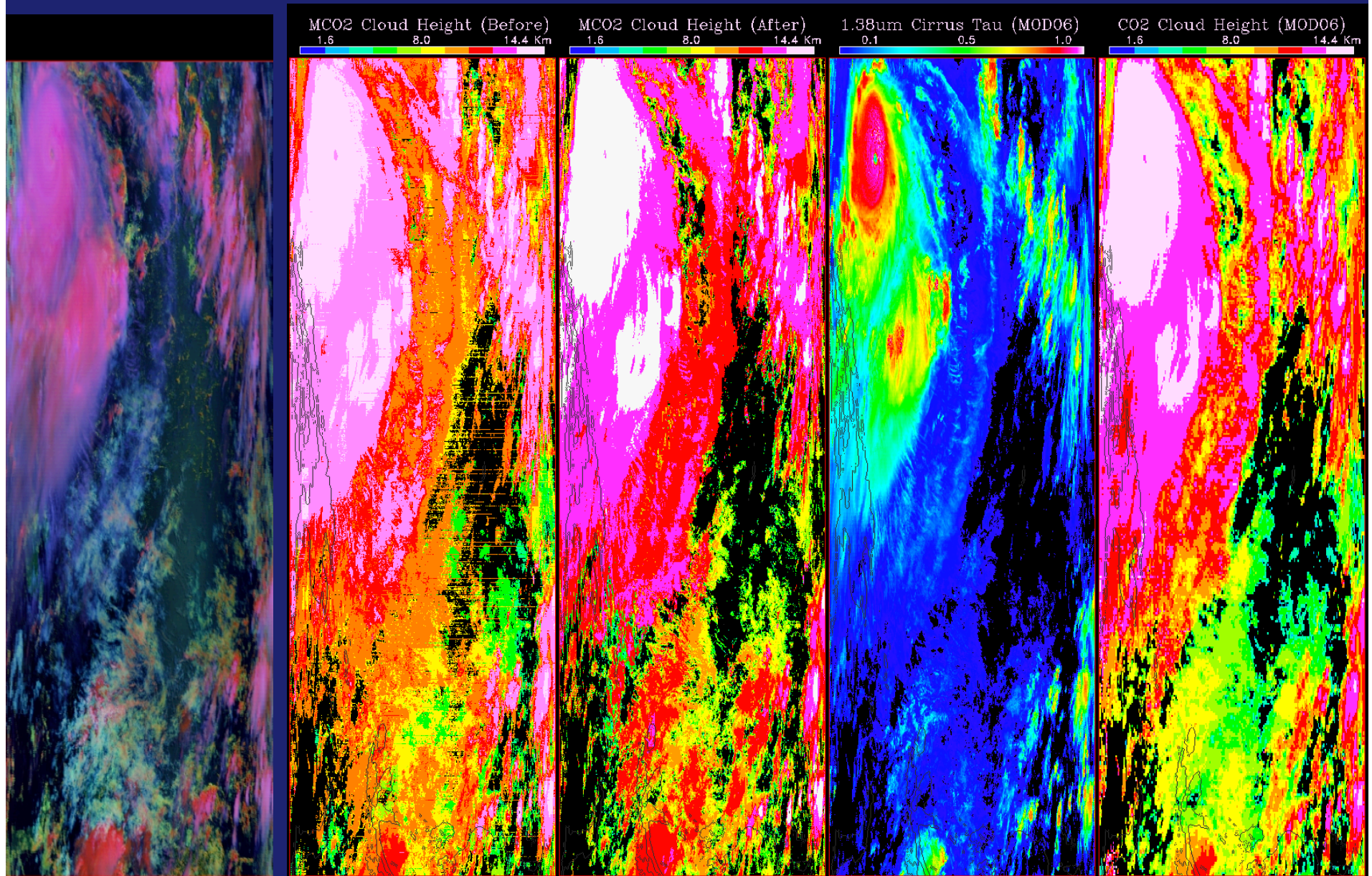
Resolved CO2 Cloud Height Striping Problem (cont'd)



A Different Case of CO₂ Cloud Height Retrieval



Resolved CO2 Cloud Height Striping Problem (Cont'd)



Pixel-by-Pixel Evaluation Using the 1.38- μ m Cirrus Cloud Retrieval

Beta2 (Terra)

Ed3? (Terra)

HEIGHT	FALSE	GOOD	MISSED	FALSE	GOOD	MISSED	FALSE	GOOD	MISSED
LOW LATITUDES (0-30 degree)									
14 Km	0.00	6.05	35.11	0.03	5.60	35.56	0.01	2.94	38.22
12 Km	0.04	22.12	19.04	0.47	21.40	19.76	0.07	13.43	27.73
10 Km	0.07	27.00	14.16	0.59	26.18	14.97	0.29	23.72	17.43
8 Km	0.09	29.05	12.11	0.68	28.18	12.97	0.66	29.44	11.71
6 Km	0.56	31.26	9.89	1.19	30.30	10.86	1.13	33.00	8.16
4 Km	1.17	32.47	8.68	1.80	31.41	9.75	2.17	34.96	6.20
MID LATITUDES (30-60 degree)									
14 Km	0.00	0.28	54.20	0.00	0.20	54.29	0.00	0.12	54.37
12 Km	0.00	2.84	51.65	0.01	2.80	51.68	0.01	1.79	52.69
10 Km	0.02	7.61	46.87	0.02	6.86	47.63	0.05	5.75	48.74
8 Km	0.03	15.37	39.12	0.04	14.38	40.11	0.17	14.69	39.80
6 Km	0.30	22.72	31.76	0.28	21.64	32.84	0.41	24.09	30.39
4 Km	0.88	29.26	25.22	0.84	28.02	26.47	1.06	30.56	23.93
HIGH LATITUDES (60-90 degree)									
14 Km	0.00	0.00	57.79	0.00	0.00	57.79	0.00	0.01	57.79
12 Km	0.00	0.00	57.79	0.00	0.01	57.78	0.00	0.01	57.78
10 Km	0.00	2.75	55.04	0.00	2.52	55.27	0.00	0.66	57.13
8 Km	0.00	7.31	50.48	0.00	5.97	51.82	0.01	5.75	52.05
6 Km	0.00	13.13	44.66	0.00	12.08	45.71	0.04	14.63	43.16
4 Km	0.00	21.01	36.78	0.04	20.46	37.33	0.13	27.76	30.03

Pixel-by-Pixel Evaluation Using the 1.38- μ m Cirrus Cloud Retrieval

Beta2 (Aqua)

Ed3? (Aqua)

HEIGHT	FALSE	GOOD	MISSED
14 Km	0.00	2.16	26.75
12 Km	0.03	14.53	14.38
10 Km	0.04	16.96	11.95
8 Km	0.04	18.36	10.55
6 Km	0.14	19.84	9.07
4 Km	0.33	20.71	8.20

LOW LATITUDES (0-30 degree)

FALSE	GOOD	MISSED
0.00	2.04	26.87
0.03	14.46	14.45
0.07	16.82	12.10
0.07	18.07	10.84
0.16	19.51	9.40
0.37	20.32	8.59

FALSE	GOOD	MISSED
0.01	1.83	27.08
0.10	9.59	19.32
0.26	14.48	14.43
0.36	17.29	11.62
0.43	18.89	10.02
0.53	19.80	9.11

MID LATITUDES (30-60 degree)

14 Km	0.00	0.27	59.17
12 Km	0.00	2.52	56.92
10 Km	0.00	9.10	50.34
8 Km	0.00	15.38	44.05
6 Km	0.02	22.93	36.51
4 Km	0.14	28.57	30.87

0.00	0.23	59.21
0.00	2.54	56.90
0.01	8.99	50.45
0.01	14.75	44.69
0.03	22.23	37.21
0.16	28.05	31.39

0.00	0.21	59.23
0.01	2.35	57.09
0.04	7.96	51.48
0.06	15.19	44.25
0.09	23.13	36.30
0.19	28.61	30.82

HIGH LATITUDES (60-90 degree)

14 Km	0.00	0.00	63.58
12 Km	0.00	0.00	63.58
10 Km	0.00	1.96	61.62
8 Km	0.00	9.06	54.52
6 Km	0.00	19.98	43.60
4 Km	0.01	31.65	31.93

0.00	0.00	63.58
0.00	0.01	63.57
0.00	1.77	61.81
0.00	7.60	55.98
0.00	18.85	44.73
0.01	31.50	32.08

0.00	0.01	63.57
0.00	0.09	63.49
0.00	1.60	61.98
0.01	7.82	55.76
0.03	18.90	44.68
0.06	32.06	31.52